

6. (amended) An apparatus according to claim 1 wherein the signal analyzer normalizes the reference and sample signals by determining a ratio of the signals.

8. (amended) An apparatus according to claim 7 wherein the signal analyzer determines the corrected sample signal, X_m , using the expression $X_m = X_t / \{Y_0 + C(Y_t - Y_0)\}$,

where C is the correction factor, Y_0 is the reference signal at time 0, X_t is the sample signal at time t, and Y_t is the reference signal at time t.

23. (amended) A substrate processing apparatus comprising:

- (a) a chamber capable of processing a substrate, the chamber comprising a radiation source;
- (b) a detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal; and
- (c) a signal analyzer adapted to receive the sample signal and determine a corrected sample signal, X_m , using the expression $X_m = X_t / \{Y_0 + C(Y_t - Y_0)\}$,

where C is a correction factor, Y_0 is a reference signal at time 0, X_t is the sample signal at time t, and Y_t is the reference signal at time t.

26. (amended) An apparatus according to claim 23 wherein the detector is adapted to detect a radiation originating from the radiation source and generate the reference signal, and wherein the signal analyzer is adapted to receive the reference signal and determine a normalized signal from the sample and reference signals.

30. (amended) A substrate processing apparatus comprising:
- (a) a chamber capable of processing a substrate, the chamber comprising a radiation source;
 - (b) a sample detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal;
 - (c) a reference detector to detect a reference radiation from the radiation source and generate a reference signal; and
 - (d) one or more first fibers to transmit the reference radiation from the radiation source to the reference detector and one or more second fibers to transmit the reflected radiation from the radiation source to the chamber, the first and second fibers arranged to receive radiation from one or more areas of the radiation source that have about the same size.
33. (amended) An apparatus according to claim 30 wherein the areas are from the same region of the radiation source.
34. (amended) An apparatus according to claim 30 wherein the first and second fibers are arranged to have substantially overlapping field of views.
35. (amended) An apparatus according to claim 30 wherein the first fibers lead directly from the radiation source to the reference detector.
36. (amended) An apparatus according to claim 30 further comprising a lens to focus the reference radiation from the radiation source onto the first fibers.
37. (amended) An apparatus according to claim 30 further comprising a signal analyzer to receive the reference and sample signals and normalize one relative to the other, and optionally, to correct the sample signal for background radiation.

38. (amended) A substrate processing apparatus comprising:

- (a) a chamber capable of processing a substrate, the chamber comprising a radiation source that includes a plasma;
- (b) a sample detector to detect a reflected radiation from the substrate or a chamber wall and generate a sample signal;
- (c) a reference detector to detect a reference radiation from the plasma and generate a reference signal; and
- (d) one or more fibers to transmit the reference radiation to the reference detector, the fibers arranged to receive reference radiation which is not reflected from the substrate.

39. (amended) An apparatus according to claim 38 wherein the fibers receive reference radiation that is viewed from the side of the plasma, or that is viewed from an angle which is not from directly above the substrate.

40. (twice amended) A substrate processing apparatus comprising:

- (a) a chamber comprising a radiation source other than a plasma in a process zone in the chamber;
- (b) one or more detectors to detect an intensity of a first radiation reflected from a substrate or a chamber wall to determine a thickness of a layer on the substrate or chamber wall, and detect an intensity of a second radiation from the radiation source; and
- (c) a feedback controller adapted to regulate a power level of the radiation source in relation to the detected intensity of the second radiation.

42. (twice amended) An apparatus according to claim 40 wherein the feedback controller is adapted to maintain the intensity of the second radiation at a substantially constant level.

44. (twice amended) A substrate processing apparatus comprising:
- (a) a chamber;
 - (b) a radiation source capable of generating a radiation;
 - (c) a first detector to detect a property of the radiation from the radiation source and generate a reference signal in relation to the property;
 - (d) a radiation modulator in a path of a radiation being transmitted from the radiation source to the chamber, the radiation modulator being adapted to receive the reference signal and control a property of the radiation in relation to the reference signal; and
 - (e) a second detector in a path of the radiation, the second detector capable of detecting an intensity of the radiation reflected from a substrate or a chamber wall to determine a thickness of a layer on the substrate or chamber wall.
45. (amended) An apparatus according to claim 44 wherein the first detector is adapted to detect a property of the radiation comprising one or more of an intensity, phase or wavelength.
47. (amended) An apparatus according to claim 46 wherein the radiation modulator is adapted to maintain the intensity of the radiation at a constant level.
48. (amended) An apparatus according to claim 46 wherein the radiation modulator comprises a shutter, mirror, or variable density screen.
49. (amended) An apparatus according to claim 46 wherein the radiation modulator comprises a means for partially attenuating the radiation.
51. (amended) An apparatus according to claim 44 wherein the radiation is transmitted to the first detector by one or more radiation transmitting fibers.